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RESEARCH NOTE



CENTRAL STATES FOREST EXPERIMENT STATION
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BURNING DOES NOT CONTROL YOUNG HARDWOODS ON

SHORTLEAF PINE SITES IN THE CUMBERLAND PLATEAU

Shortleaf pine is a better commercial species for the dry upland flats of the Cumberland Plateau in Kentucky than most of the native hardwoods. But in order to obtain natural pine regeneration, some practical method for destroying the dense hardwood understory or at least retarding its growth must be found.

Shortleaf pine seedlings are intolerant to shade and much slower growing than hardwood sprouts, characteristics that prevent pine emergence from the overtopping hardwoods. Because controlled burning has been effective in preparing sites covered with dense young hardwoods for pine regeneration in the Piedmont and the southeast Coastal Plain Regions,^{1/} fire was tried in the Cumberland Plateau area for controlling competing hardwoods.

^{1/} Hodgkins, Earl J. Effects of fire on undergrowth vegetation in upland southern pine forests. Ecol. 39(1): 36-46, illus. 1958.

Little, S., and Somes, H. A. Prescribed burning in the pine region of southern New Jersey and eastern shore Maryland. A summary of present knowledge. U.S. Forest Serv. Northeast. Forest Expt. Sta. Paper 151, 21 pp., illus. 1961.

Lotti, Thomas. Eliminating understory hardwoods with summer prescribed fires in Coastal Plain loblolly pine stands. Jour. Forestry 54: 191-192. 1956.

A 7-acre oak-pine stand on a broad ridgetop with a coarse, sandy loam soil was selected for the study. The stand, consisting of a typically dense, low-hardwood understory of shrubs, small-tree species, and advance growth of commercial species, was commercially clear cut in 1956 excepting seven well-distributed shortleaf pine seed trees per acre. It was believed that the opening of the stand and the scarifying action of the logging operation might stimulate pine reproduction and growth.

Three years after cutting, the understory had developed into a dense cover of young, vigorous hardwoods--5,400 stems per acre less than 5 inches d.b.h.--and less than 900 pine seedlings per acre, most of which were small, overtopped, spindly, and dying.

On April 27, 1959, burning conditions were favorable and the 7-acre tract was burned. The fire destroyed most of the litter and was hot enough to kill 75 percent of the stems less than 5 inches d.b.h. Of course, the hardwood root systems were not killed so most of the root stocks sprouted. By the end of the growing season, vigorous hardwood sprouts were well established in the understory. By fall it was clear that the controlled burn had not reduced the understory hardwoods. In fact, the number of stems per acre more than doubled. There was enough fuel on the ground to burn the area a second time, however, so preparations were made to re-burn the area. It was thought that a second burn might reduce the sprouting vigor of the hardwoods. Satisfactory fuel conditions occurred on April 29, 1960, and the area was again burned. This fire destroyed all the litter and enough of the duff to expose mineral soil on about 20 percent of the area. Also, the fire was hot enough to kill more than 95 percent of the stems less than 5 inches d.b.h.

Two growing seasons later it was apparent that this treatment had not controlled the hardwood understory. Number of hardwood stems had increased 173 percent from 5,400 per acre before treatment to 14,800 after two burns (fig. 1). Number of pine seedlings increased slightly but probably very few of these will survive the hardwood competition.

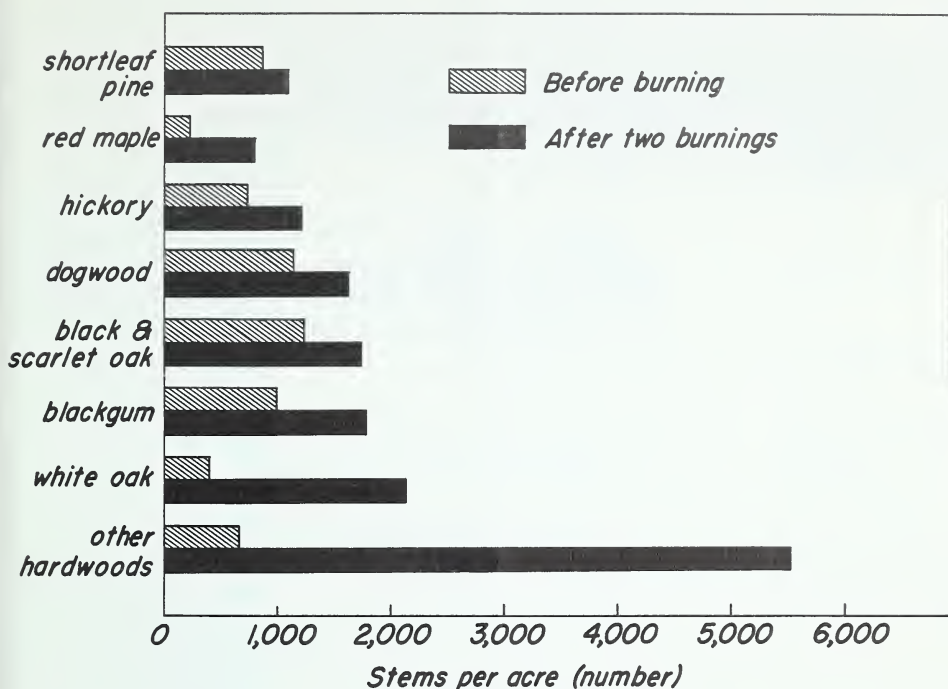


FIGURE 1.--Number of stems less than 5 inches d.b.h. before and after two burning treatments.

No effort was made in this exploratory study to evaluate the effect of the treatment on site and watershed conditions.

After the first controlled burn, 178 individual hardwood stems less than 3 inches d.b.h. were tagged. Two years after the second burn this number had increased to 726 because of sprouting. The fire did kill many of the small trees less than 3 feet tall. But, most of the taller individuals developed into multiple-stemmed clumps after burning. Probably few of these sprout clumps will develop into quality trees on this site. Furthermore, the undesirable species such as red maple, blackgum, sourwood, and dogwood were the most prolific sprouters.

Controlled burning oak-pine stands on the Cumberland Plateau decreases the height of the hardwood understory but greatly increases the number of stems, making it almost impossible to regenerate shortleaf pine. Therefore, it is not a recommended site-preparation technique for regenerating pine-oak stands in this area.

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